



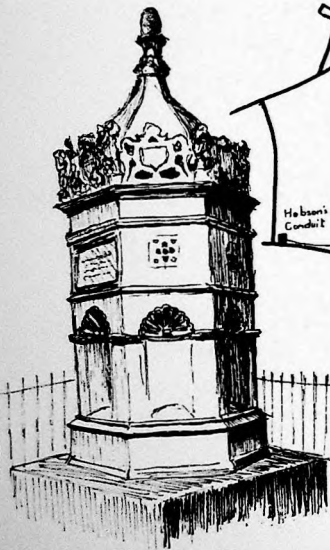
Hobson's Conduit

The story of a Cambridgeshire chalk stream

Ernest A. Gray

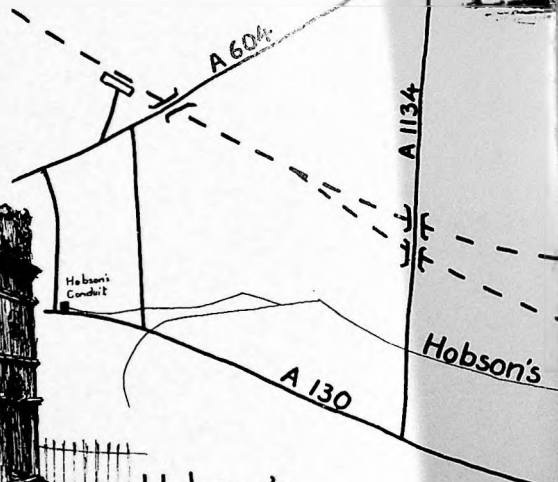
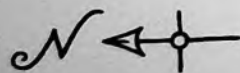


Gog Magog Hills



Hobson's
Conduit

Cambridge

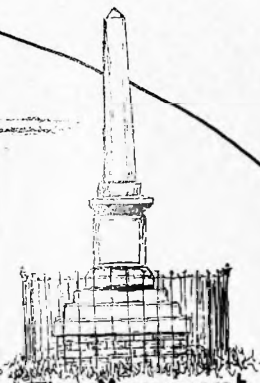


604 to Babraham

White Hill

Nine
Wells

The Monument



Gt Shelford

Trumpington




A 130

A 10(r) to Hauxton

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Cambridge
1977

Dr. Ernest A. Gray has been a Cambridge resident for eighteen years, with an interval of some years absence working elsewhere. He took a PhD on the second of two studies of Hobson's Brook carried out at the University of Cambridge. He has assisted at official 'digs' near the Roman Wall and elsewhere, and his historical tales for older children have been translated into four European languages. The late Sir Mortimer Wheeler gave priceless advice in writing 'Roman Eagle Celtic Hawk' a tale of the Ninth Legion mentioned in the story of Hobson's Brook.



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“ . . . If you walk this way you will go nowhere
The lane leads, not to any place on earth
But into time . . . ”

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The Jacobean Fountain at the corner of Lensfield Road and Trumpington Road.

Rado Klose

Chapter 1

IN THE BEGINNING

'Then said he unto me ... 'These waters issue forth toward the eastern region ... and they shall go into the sea ... and every-thing shall live whithersoever the river cometh...'

Ezekial XLVII.8,9

A familiar sight to Cambridge visitors is the artificial river which flows past the University Botanic Gardens parallel to the London Road. It terminates in an open cistern, the Conduit Head, at the corner of Lensfield Road and Trumpington Road. Here stands a handsome Jacobean fountain that once graced the market place, and a board which informs the curious that the leat is called Hobson's Conduit and that it was completed in 1614 to bring a supply of fresh water to Cambridge. In actual fact, it was originally constructed to flush out the King's Ditch; supplying Cambridge with water was an after-thought. It is also called Hobson's River, and commonly Hobson's Brook, for in the course of centuries it has acquired all the characteristics of a natural stream. The Nine Wells springs, two miles due south of Cambridge, are the principal sources of its waters. To conduct them into the city, cuttings joined at angles were inserted into a stream called the Vicar's Brook. A 'new river', as Daniel Defoe describes it, was formed; a contemporary of the Hertfordshire New River that supplied London with water.

The parent stream rises in Shelford, about four miles south of Cambridge, and flows northwards down a wide shallow valley defined by the 50 foot contour to the Cam. The source is presumably a spring, but it is built over, and the water is conveyed through iron pipes whose direction is indicated above ground by a line of old willow trees. Emerging into the open half a mile down the valley, it receives the waters from two springs on the western and southern aspects of a spur of chalk, White Hill, projecting from the chalk that forms the eastern wall of the valley. On the west is clay coated with glacial debris. The waters of the solitary spring south of White Hill rise through the ground and run away under Granhams Lane into the Shelford stream. On the west are the famous Nine Wells, nine denoting an indefinite number, as in some springs of ancient Greece. The stream has been canalised from this point on, and the waters led under

Long Road progressively northwards through the suburbs to the Conduit Head. The only remaining portion of the original stream may be a cut-off which turns away north-west to the Cam, shortly after the canal enters the suburbs. The former name of the Vicar's Brook has been attached to the leat from the Nine Wells up to and including the cut-off, restricting Hobson's Brook or Conduit to the remaining short section leading past the Botanic Gardens. But this is to belittle the scope of the undertaking. Defoe speaks of 'the new river from White Hill' and the canal has been very skilfully cut to preserve the flow of the springs down from the Nine Wells to the Gardens, although there is a fall of only $7\frac{3}{4}$ feet between them and the springs. Thirty years ago their average output was 50 litres per second, but today it is considerably less.

The springs rise just above the 50 foot contour and are one of the series of springs breaking out along the line of the Burwell Rock, or Totternhoe Stone, from Shelford to Burwell, eleven miles north-east of Cambridge on the edge of the Fens. Water-tight Chalk Marl lies beneath the upper beds of porous chalk, and the water is thrown out from the Nine Wells by the Burwell Rock, an impervious, hard, well-fissured band of chalk above the Marl. The story of Hobson's Conduit thus opens much farther back in time than the canalisation of its waters, in the far distant past when these strata were muds and silts laid down on the floor of the Chalk Sea that once covered the south of Britain, by rivers flowing from a northern continent. The finest particles formed the Gault now found about a hundred feet below the Marl. Coarser particles formed the Greensand represented by a thin band beneath the Marl, which although narrow has played a significant part in influencing the human population of the district. Bones of grotesque reptiles roaming the continent were buried in the deposits, while vast sponge beds spread across the sea floor. As time wore on, the composition of the deposits slowly changed, until the bed of the sea glimmered ghostly white from successive layers of chalk. Finally the chalk emerged above the sea as a fold running in a general direction south-west to north-east across the centre of a large peninsular jutting northwards from the European land mass. As it gradually emerged, it was covered by deciduous forest and savannah spreading out from the Continent. The first rain storms washed the salt out of the chalk, and when the water seeped further into the beds, it reacted chemically with the remains of the old sponge beds and the silica of their simple skeletons. Extensive layers of black flints resulted, but the action ceased as the water crept still lower. Flints are therefore found only in the upper chalk, enabling a clear

distinction to be made between the Upper horizons as they are called, and the Middle and Lower horizons beneath. When the water reached impervious beds, it broke out into the open through fissures in the rock as a chalk spring. At the Nine Wells, and no doubt generally elsewhere, water breaking from the rock face is slightly acid from dissolved carbon dioxide. Basins with dazzling white floors are worn in the soft stone, and filled with clear spring water, they once mirrored the elephant, elk and wild horse that came to drink, not to mention a host of birds. Early Man no doubt drank from the pools, his clumsy flint tools (palaeoliths), chipped from the flints accessible in the upper chalk, have been found in the old Cam river gravels not a mile from the springs. The Great Pleistocene Ice Age set in, but the final Hunstanton glaciation did not reach Cambridge. For many years the chalk was subjected to the disintegrating effects of freeze-and-thaw tundra conditions, resulting in the rounding of hills (e.g. White Hill) while valley bottoms were filled with a mush of snow, mud and wet chalk.



A spring — the start of the story:- the solitary spring on the south of White Hill as it was in 1948.



The spring examined at both enquiries late summer 1971.

When the ice retreated for the last time, the streams that poured from beneath the melting ice broadcast a fine loam derived from Boulder Clay, and destined to have a profound influence on British farming. Very slowly there emerged the stage on which the recent, human, history of the Brook has been played. A wide shallow valley, an ancient bed of the Cam, open to the south over the chalk, but separated from a wide meander of the Cam, by a fold of the 50 foot contour to the North. A stream wound down the slope to the river, cutting through and across the loams of the second terrace of river gravels. Rising in what is now the parish of Shelford, and receiving the waters from the Nine Wells, this stream is the only one in the parish of Trumpington, and both villages are important in the history of Hobson's Brook. Trumpington is the nearest village to the springs, the church tower faces them less than a mile due west.

The warm, dry post-glacial climate turned cool and moist as the North Sea filled up and the Atlantic encroached on the west coast of Britain. Hazel flourished on the chalk, and ash and alder sprang up in the wet valley bottoms. Varieties of willow (*Salix*) spread along the banks of the stream, whose margins were defined by dense beds of the common reed (*Phragmites*). Calcicole plants, notably the Water Cress (*Nasturtium officinale*) flourished in the chalky waters accompanied by a variety of Pond Weeds (*Potamogeton*) the Water Starwort (*Callitriche verna*) and the Water Buttercup (*Ranunculus aquatilis*), whose seeds and fruits have been found in post-glacial, some in inter-glacial, deposits.

Nosing up stream from the Cam came the Brown Trout seeking the Water Shrimp (*Gammarus*) that haunts chalk streams, the Three Spined and Seven Spined Stickleback, the Minnow and the Bullhead or Miller's Thumb. Also the eels that after spending perhaps a dozen years in the upper reaches, made their way down stream again, never to return. And there would be beaver, too, building dams responsible for extensive swamps.

Chapter 2

THE FIRST FARMERS

The soil of the valley, a sandy loam buffered by chalk, is regarded as some of the best wheat land near Cambridge. Centuries of cultivation have erased all traces above ground of the first farmers. The Iron Age farm revealed in 1967 about a mile north-east of the Nine Wells, during excavations for the New Addenbrookes Hospital, gives reason to hope that earlier sites remain to be discovered. Wandlebury, the earthwork with a double ring of ditches perched on the Gogs little more than a mile east of the springs, dates from 500 B.C., and the Iron Age farm would be the last of a number of prehistoric settlements watered by the Brook but sited above it. The clay to the west was forest-covered until well into mediaeval times and the valley bottom was choked by vegetation, and marshy from beaver dams. The farms would therefore be established on the dry chalk, whose slopes were the first to be cultivated. The present farm on White Hill is surrounded by plough land, although the soil is seldom more than a foot deep, and Defoe mentions a farm there when he visited the leat.

Neolithic farmers crossed to Britain before 3000 B.C., bringing with them primitive wheat as well as domesticated cattle, sheep, pigs and goats, kept in order by a dog resembling a big fox terrier. Opposed by tangled forests and swampy valleys, they drove their flocks and herds along the crest of the chalk deep into the green heart of Britain.

A Neolithic causeway camp has lately been excavated at Great Wilbraham, on the edge of the chalk about seven miles east as the crow flies from the Nine Wells, whose clear pools possibly reflected the dark features of a Neolithic girl, plaiting a rush basket as she listened to the thud of stone axes felling ash and beech saplings. (Far away at Mongewell in Berkshire two Neolithic clay pots a girl had ornamented with impressions of her finger nails, were found close by chalk springs.) No apparent traces remain near the Wells where her father rounded up his cattle in autumn, but he found abundant timber to build his wooden gabled house, barns and granaries, and thatched them with reeds from the Brook. Britain's rich heritage of rural crafts is a tradition handed down by those early settlers. With a cleaving axe, the woodsman's essential tool, albeit his was flaked from stone, he not only cut hard wood for his buildings (the Late Celtic craftsmen who built the Glastonbury lake village freely employed

mortise and tenon joints) but split the chalk-loving hazel into strips woven into wattle hurdles for sheep pens, and used the plentiful ash for scythe and rake handles. It was noticed that the stumps of hazel and ash sprouted again, yielding new crops a few years later, and the ancient practice of coppicing was introduced. The Brook supplied not only reeds for thatch but also willow trees whose shoots could be woven into baskets and hurdles, or cut into split-willow cribs for feeding livestock.

The Bronze Age farmer who followed the Neolithic cattle rancher along the chalk was the first to cut furrows on White Hill, for he was a mixed farmer, a cultivator of light soils, loams and silts. First with a pointed stick (the Orkney hand plough is direct descendant) then by a simple plough drawn by a pair of small, long faced oxen. A heavier plough was introduced in the first century B.C., drawn by a team of eight oxen, difficult to turn, so that the ploughman drew his furrows in long straight strips. The 'sense of labour' of the oxen was accompanied by 'the usual rude song, a sort of chaunt of half or quarter notes' which his heirs still sang to the oxen as late as 1810. Beans and wheat were staple crops; Celtic beans were about the size of a pea and wheat from a Somerset settlement c. 150 B.C. was of a primitive type, with each spikelet holding but two grains.

Only fragmentary remains of the Iron Age farm could be recovered from the Addenbrookes works off Long Road in the summer of 1967. The site was extensive, the main feature being a large rectangular enclosure ditch surrounding an area approximately 350 feet across. The bottom of the ditch was filled with fragments of animal bones, mostly cattle and sheep, and broken pottery of rough Iron Age type was also found. In addition to this ditch, various roughly parallel ditches ran east west along the southern edge of the site. A small hand-made pot of smooth blackish ware was found in the southernmost of these subsidiary ditches, and immediately to the south of this ditch an undisturbed area contained what was probably the remains of a house, with three post holes. Air photographs of the Downing College playing field and the adjacent field, both adjoining the hospital site, have revealed crop marks of a possible Romano-British agricultural settlement. On the evidence available, a definite impression remains of a site late in the Iron Age, possibly even verging on Roman. The farm was thus perhaps occupied at the time of the Claudian invasion A.D. 43, and the farmer and his family gaped at foreign horsemen riding over the sky-line from the direction of the Gogs, where smoke signals rose from the Wandlebury ramparts. Perhaps they saw a troop of



Looking east across the brook to White Hill and the springs at its foot. The valley has been under cereal cultivation for at least 1,000 years.

Thracian Horse, part of the screen of Auxiliary Cavalry probing the countryside far in the van of the Ninth Legion — *Legio Hispana* for meritorious service in Spain, but fresh from Pannonia in Hungary — as it toiled up from Essex in the *Agmen Quadratum*, Hollow Square formation adopted in hostile or unfamiliar country. (No British battle honours, but two disasters awaited it in the years of bitter fighting ahead.) Longinus son of *Sdapezymatogous* possibly led the troop; he was an early casualty of the campaign, his tombstone may be seen in Colchester Museum. The Standard Bearer may have reflected, while the troop watered their horses at the Nine Wells, that this was a green, well-watered spot where an old sweat like himself might settle down very comfortably when he got his discharge and the grant of land that went with it. But any veterans who retired to the valley died when Boudicca's avenging tribesmen stormed across the district in A.D. 61 (and cut up the Ninth Legion). There is an old earthwork close by the solitary spring on the south-west of White Hill, a rectangle with rounded corners about a hundred yards long by eighty yards wide. The spring waters bubble up at the north-east corner and flow down the north and west ditches beneath the crumbling ramparts. Marked on old maps as the site of King John's hunting lodge, twenty years ago the late T. C. Lethbridge, Honorary Keeper of Anglo-Saxon Antiquities at the University, concluded it was first century Roman after examining a section cut through the north wall, although no pottery was found to confirm his diagnosis. Perhaps it was decided that no matter if Wandlebury marked the western boundary of the kingdom of Prasutagus, who had sworn allegiance to the Emperor, a strong point should be established here until the Cam was safely crossed. Alternatively, Miss M. D. Cra'ster, Assistant Curator at the University Museum of Archaeology, suggested after a recent inspection of the site that it might possibly be an Iron Age enclosure — (a cattle compound?) — dating from the last centuries B.C., similar to the one attached to the Addenbrookes farm. It would not contain a house; the Addenbrookes house was outside the enclosure, and thus fragments of pottery might not be easily found in the ditches. The early dates given by both these authorities affords further proof of prehistoric settlements close to the stream. Cattle graze today in the enclosure, and there is still a farm on the site which has a mediaeval dove-cote. Whitehill Farm, on the slopes above the Nine Wells, is no more than half a mile away to the north.

During the second century A.D. corn production in the district was intensified to feed the troops building Hadrian's Wall. But it was during the

Dark Ages that followed the Roman occupation that the Angles, followed by the Saxons, finally cleared the floor of the valley and brought into full production the rich loam through which the stream ran. The Angles, cultivators of heavier soils, held the fields south-east of Cambridge, including Trumpington and therefore the valley of the Brook. But across the Cam was Mercia, and Angles, or Mercians, possibly dug the first King's Ditch, a dry moat linking the two arms of the river which enclosed mediaeval Cambridge, as a bridge-head to secure the crossing. (Roman Cambridge had been perched on the hill across the river to the north.) The fertility of the valley soil was preserved by a time-honoured practice of three courses

Autumn corn – wheat or rye

Spring corn – oats, barley, or peas

Fallow – under grass, grazed till mid-summer, then ploughed.

This system was probably in vogue among Celtic farmers before the Roman occupation. The Saxons gave the springs their present name, for the word Well is derived from the Anglo-Saxon 'Wielle' or 'Welle', a spring. Ten acres were necessary to support a household, and to prepare a seed-bed for food crops, the most powerful tool was the plough. But this called for a team of possibly a dozen oxen, and a Saxon village had to combine all its resources to muster an adequate plough team. In autumn as much as possible of the stubble left after the harvest was broken up, and in the spring ploughing began again as soon as weather permitted. A day's ploughing was allotted in turn to each man, so that he lost no time in sowing it. Thus arose the Open Field System, of strips of ploughland grouped into three huge open fields, each of which in turn lay fallow, or was sown with winter or spring corn. This system included rights all enjoyed, of turning stock on the harvest stubble, or on common waste ground not cultivated. A Saxon farmer had not learnt the art of grass and was perennially short of hay for winter feed for his livestock, so it is not surprising that the emblem of his patron saint, Walstan of Bamburgh, was a hayrake, not a plough. Seed-time and harvest continued still, despite the incursions of Danish freebooters. The unknown poet of the Song of Maldon records the heroic death of Brithnoth, Reeve of Cambridgeshire, who held much land around the Nine Wells.

The Danes sacked in 870 the monastery founded at Ely in 673 by Queen Ethelreda whose husband and all his pagan court were baptised in chalk springs at Exning, near Newmarket. Who perhaps was baptised at the Nine Wells by some early evangelist?

The Norman Conquest was responsible for the earliest existing record of the Brook. It is written down in the Domesday Book in double columns of monkish Latin, by a large, clear, even hand for all men to read for ever that in 'Trumpintone in the Hundred of Thriplow ... on land of Picot of Cambridge, Hervey holds of Picot 2 hides and 1½ virgates ... there is land for 2½ ploughs ... meadow for the ploughs ...and a stream (or weir) for 450 eels.' This can only be the stream from the Nine Wells, for as previously mentioned it is the only stream in Trumpington. At one point, where it runs over the 45 foot contour, it still runs fast as if over a wier. Eels, of course, were valued food. Furthermore, at 'Escelforde' (Shelford) in the same Hundred, a manor owned by the Church of Ely had two mills yielding 45/- "and two pigs were fattened from the Mill." The old willow trees above the iron pipe conducting the waters of the principal Shelford stream show that it comes from the direction of a flour mill in full operation beside the London (Liverpool Street) railway, and one of my Lord of Ely's mills may have stood on the original stream.

Duke William sent out Commissioners all over the country after a conference at Gloucester in 1085. They held an enquiry in every shire town as to the exact wealth of each Hundred into which the shires were divided. In Cambridgeshire the Hundred of Thriplow included the parishes of Trumpington and Shelford. Those who bore witness to the Hundred of Thriplow were Ralph the Reeve of the Hundred; Tedbald the man of Hardewin; Stanhard of Hauxton and Godric of Fowlmere; Aluric of Thriplow, William of Caillo and Ralph of Barrington. There must have been some remarkable hard swearing at the Moot Hall in Cambridge, even worse than that in other shire towns, for Cambridge had suffered woefully from Hereward's last stand at Ely, and some Saxon nobles had been dispossessed of estates in favour of Normans. The Hall was crammed to bursting, for the Commissioners summoned to attend the Sheriff of the Shire, the landowners or tenants-in-chief with their followers, and juries representing each Hundred selected from deputations formed by the priest, the reeve, and six villeins from each vill, or hamlet. Hearings began early in the morning and continued until dusk, for the task was immense. First the size of the holdings had to be agreed upon, and next, almost as important, whether the land was as productive as in the past. It appears however that despite all the fines and dispossessions, the valley of the Brook was in 'good heart', so carefully had it been cultivated.

After all the available information had been most carefully sifted and recorded, the final returns were sent to the Exchequer, where the material

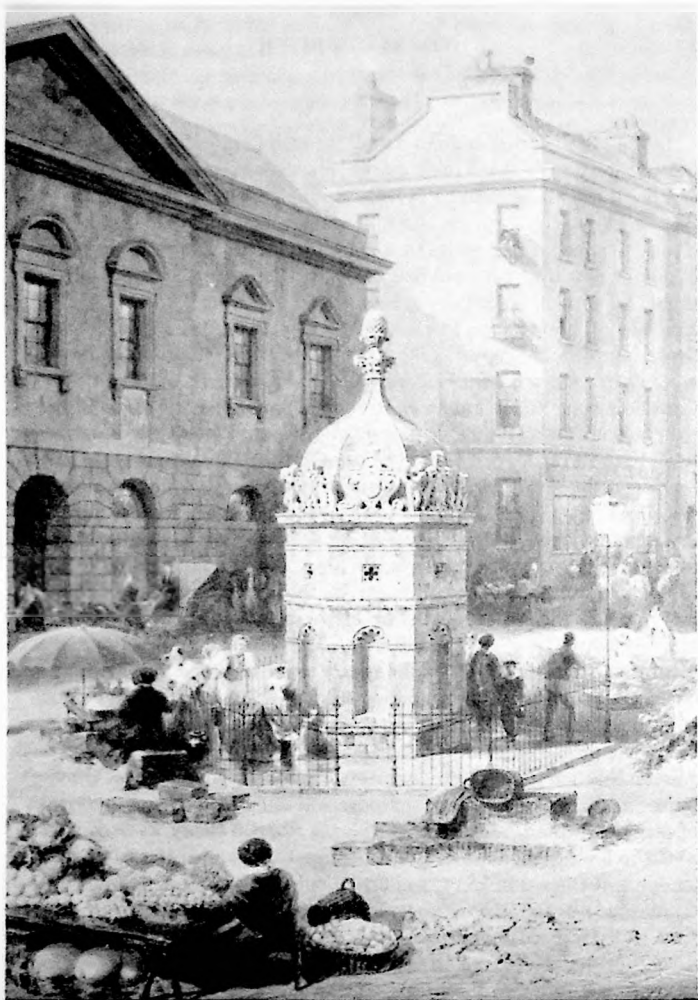
was put together, so far as the authors were concerned for eternity. Hence Domesday Book in sober truth.

The Sheriff held the land adjacent to the Wells, that Orulf held under King Edward, but there was no mention of Ely. Nor had Ely claim on the meadow where a road wound up to the Manor, for that was formerly held by Herulf, King Edward's Thegn. Ely had no lawful rights except on a parcel of land in the 4½ virgates at present held by William de Warenne, he whose brother was killed by Hereward the outlaw. Under King Edward, Tochi held it from Ely, and he could neither give nor separate it from the Church. Yet at the south-west corner of the Nine Wells there is a small field, perhaps fifty yards square, which today is called Monk's Corner. Was it once set aside for the priest's corn tithe? Or did my Lord of Ely manage to secure at least this little piece of the rich heart of the valley?

Chapter 3

THE KING'S DITCH

In the year 1216 King John passed through Cambridge to the Wash and ordered the King's Ditch to be dug as an additional protection to the castle for the town. Or perhaps he ordered an original ditch dug during the Dark Ages to be brought into use again. It was enlarged and deepened by Henry III when he lay at Cambridge in August 1265 in pursuit of followers of Simon de Montfort who had fled to the Fens. He stipulated that the town should be kept clean 'and the great ditch of the town cleansed' in a Charter granted to Cambridge on February 22, 1267. It stretched from Jesus Green opposite the Pepysian Library of Magdalen College across the grounds of Sidney Sussex College, along Hobson Street and Tibbs Row, up Corn Exchange Street and down Pembroke Street and Mill Lane to the river at the King's Mill opposite Queen's College. It was a dry moat, never filled by water from end to end, because of the nature of the ground, useless as a defence, but which could not be filled in without express permission from the Crown. Soon the town spread beyond it, but a century later it was still as open as it was when Roger de Trumpington died in 1289, and was buried in the church under a fine brass, the second oldest in England, (or was, it cannot be expected to survive the present intensive 'rubbing' indefinitely); the crossed feet of his effigy rest upon a hound, for he had safely returned from the Crusades. In 1330 Gown complained to Parliament that Town did not keep the streets clean, let alone the Ditch. After due deliberation the King appointed a Commission in 1348, not empowered to get the ditch cleansed, but to determine whose responsibility it was. The plague entered Britain early that August. Half the citizens died when it reached Cambridge. Survivors blamed the King's Ditch, although by lax mediaeval standards, Cambridge was squalid. Repeated outbreaks of plague followed, and fear of the plague stopped Henry VI from paying a visit to lay the foundation stone of Kings College Chapel, while Erasmus, studying at Queens in 1514, was driven out to Waterbeach, grumbling that Cambridge was the filthiest town in Europe. Town and Gown got together for a fruitless discussion in 1503, but Wolsey had to decree in 1526 that in default of the Mayor, the University Chancellor should punish offenders who threw refuse into the streets. In November 1574 Doctor Perme, Vice-Chancellor of the University, sat down to write to Lord Burghley the



The fountain in the Market Place in 1841.

*Fitzwilliam Museum Cambridge
F. Mackenzie*



The fountain as it is today.

Cambridge Evening News

Chancellor about the vexed problem of plague and the King's Ditch, apparently one and inseparable (and insuperable).

"Altho we must confess that our sinnes is the principall cause of this and all other plagues sent by Almighty God, yet the secundarie causes and means that God did use to bringeth the same, so far as I understand is not the corruption of the ayer as the philistines saieth at this time, but partlie the apparel of one that came from London to Midsomer Fair and died of the plague in Barnwell ... the other cause as I conjecture being the corruption of the Kings Ditch which goeth through Cambridge ..." and concluded "I send a mappe of Cambridge, the which I did first make principally for this cause, to show how *the water that cometh from Shelford to Trumpingtonford* and from thence doth now pass to ye Mylles in Cambridge ... might be conveighed from the same Trumpingtonford to the Kings Ditch ... for the perpetual scouring of the same, the which should be a singular benefite for the healthsomeness both of the Universitie and the Towne, beside other commodities that might arise thereby..."

Town and Gown adopted the suggestion twenty-five years later and agreed jointly upon a scheme 'for the cleansing and keeping sweet one common ditch or drain commonly called Kings Ditch'. A deed dated October 26 1610 was drawn up wherein Thomas Chaplyn, Lord of the Manor of Trumpington Delapole (conterminous with Trumpington Parish) agreed with the University and Town jointly that they should conduct the water from the Nine Wells across the parish and common fields of Trumpington, diverting much of it away from its natural course down the Vicar's Brook. It also states that the leat had been newly and lately made.

Straight channels were cut, each about eight feet wide and six feet deep, but varying greatly in length, descending in an open zig-zag down to the town, first west, then north-west, finally almost due north. The first channel immediately below the springs is cut through the chalk, in the second the water runs swiftly down over the 45 foot contour, and the parent Shelford stream enters at the junction of the second and third cuttings. Long Road, which now crosses the Brook, divides it conveniently into two reaches of approximately the same length, an urban reach north of Long Road where the leat becomes enclosed by streets and houses, and a rural reach south of it wholly surrounded by arable land, and quite remote since the channels can only be approached across ploughland whose crops grow right up to the brink of the stream.

A few hundred yards north of Long Road, after the leat has skirted a ploughed field, the Vicar's Brook turns away north-west from the stream,

to run down to the Cam, originally across the Trumpington Road (Trumpingtonford) but today through a culvert beneath it. A teak bridge bearing a commemorative plaque spans the Brook shortly after the Vicar's Brook turns off. It flows on past an old iron gate, the point at which it leaves Trumpington Parish to enter the parish of St. Andrews Barnwell, skirts Empty Common, and plunges beneath Brooklands Avenue to be conducted along an embankment past the Botanic Gardens to the Conduit Head. There is a spill-way for excessive water near the teak bridge, and another opens off the embankment into the pond in the Botanic Gardens. A vein of Gault clay comes to the surface at the east end of Brooklands Avenue, and thus was close at hand to build the embankment.

The work was completed by the summer or autumn of 1610, as witness the deed drawn up between Thomas Chaplyn and the University and Town jointly, at a cost of £100. It has been suggested that Thomas Wright, M.A. of Caius, the mathematician who designed the Ware to London New River, was responsible. However, any contractor experienced in cutting Fen dykes could have undertaken it, and in fact Dr Perne mentions a Richard Browne, Keeper of the Mills at Lynn, in a further letter to Lord Burghley dated January 18, 1575, enclosing his report as the workman concerned in "taking the level of the ground at Trumpingtonford to convey that water into the Kings Ditch for the scouring of the same, according to your honour's commandment". The skill with which the leat was designed and the grasp of natural forces it displays are none the less impressive. In the course of time, it has regained all the characters of a natural stream, and the smoothing hand of Nature and continuous cultivation of the valley have left no trace of the original stream except far down the final reach. Yet after three hundred and sixty years the cuttings still preserve the flow of the stream right down into the suburbs. A marvel to contemporaries, who flocked from far and near to view the wonderful New River, it continues to deserve the greatest admiration.

The cost of the undertaking was born by public subscription, and Lord Burghley was not only the University Chancellor but Treasurer to Elizabeth the First. If he mentioned the project to her, the approval of that impecunious Tudor would be more readily obtained when she learnt it was to be at public expense. Water was led from the Conduit Head down Trumpington Street to flush out the King's Ditch from Pembroke Street to Mill Lane, while a tributary passing behind Pembroke College flowed through the section passing Free School Lane to Jesus Green by way of the grounds of Sidney Sussex.

Thomas Hobson the carrier busied himself over the affair. He ran a carrier's business between Cambridge and London, and also hired out horses for private travellers — on the understanding that they took the next ready for work, whatever its age or temper. They were not permitted a free choice; as a plain seaman entered in his Journal in 1661 "We had Hobson's Choice — that or none." It would certainly be "a singular benefite for the healthsomeness" of the nags in his stables (on the site of the present Chapel of St. Catherines College, built 1704) to obtain a constant supply of spring water brought to his door by the Trumpington Street channel. A horse drinks 6 - 8 gallons of water a day (cattle as much or more) and water was required too for mucking out the stables. The commemorative plaque on the teak bridge records the three hundredth anniversary of the death of Hobson in 1631, but it is difficult to understand at this length of time why his name, and not that of Dr. Perne, originator of the scheme, came to be attached to the Brook. Four years later, in 1614, after the King's Ditch had literally been liquidated at last, the water was made available for human consumption. It was piped down the line of Tennis Court Road and Corn Exchange Street to the fountain in the market place. The present fountain, a heavy Victorian affair, was erected in 1856 when the original Jacobean one was moved to its present position at the corner of Lensfield Road. Two other channels running



The obelisk in 1948

down Trumpington Street and St. Andrews Street, flush out the gutters. These were the 'other commodities' Dr. Perne perhaps had in mind, among them are the bathing pools at Christ's College and Emmanuel, supplied from the St. Andrews channel. Peterhouse also made use of the water so close at hand; there was a bath in the Fellows garden until the beginning of the nineteenth century.

An obelisk was erected in 1861 at the south corner of the Nine Wells. It has four faces, and the inscription which is turned northward states:

"This supply of water to Cambridge from the adjacent springs was first suggested in 1574 by Andrew Perne Master of Peterhouse. The design was revived by James Montagu Master of Sidney Sussex, and in 1610 carried into effect at the joint expense of the University and Town."

The inscription which is turned eastwards reads:

"Benefactors to the Watercourse and Conduit, Thomas Chaplin Esqre Lord of the Manor of Trumpington Delapole 1610, Stephen Perse M.D. Fellow of Gonville and Caius 1615, Thomas Hobson Carrier Cambridge and London 1630, Samuel Potts Alderman of Cambridge 1632, Joseph Merrill Alderman of Cambridge 1806."

The south face is blank, but on the west face it is recorded that the obelisk was 'Erected by public subscription 1861, Charles Finch, Treasurer.'

The name of the benefactor who died in 1632 is wrongly given, it was Edward Potto.

The Brook is administered by Trustees from whom permission was sought to carry out two biological surveys of the Brook from 1946 - 49, and 1969 - 73. Under an Order made by the Board of Charity Commissioners for England and Wales dated 18 July 1898, subsequent to a similar Order of the Commissioners of 30 October 1868, the body of Trustees shall, when complete, consist of five representative Trustees appointed by the Council of the Borough of Cambridge and ten Co-optative Trustees, persons residing or carrying on business in Cambridge. The latter are appointed for five years, and the former, elected from the City Council, for four years.

Permission to carry out the two biological surveys of the Brook was not only sought from the Trustees, but care was taken to find out who farmed the land through which the stream flows. Their good will was essential, and on both occasions, those concerned could not have been more helpful, providing information that made it possible to understand the results more clearly.

Chapter 4

THE GOLDEN HOOF

A series of well marked plough furrows, remarkable for their size and depth, lay over the remains of the house of the Long Road Iron Age farm, clearly Post Iron Age but not connected with recent ploughing, being below the modern topsoil. Possibly they were cut by the ox-drawn plough of the ploughman who informed Defoe when he visited the leat in 1724 that four ploughings of the fallow were necessary. The ghost of Ralph the Reeve of the Hundred would have nodded approvingly. During his tour of East Anglia, "when going up to the Gog-Magog Hills to see the stables King James had built inside Wandlebury", Defoe turned aside to inspect "the new river from the springs arising beneath White Hill", (incidentally putting the Brook on public record for the third time.) The keen eyes of that middle-aged traveller saw a valley that still presented those "Great bare ugly fields" of the Open Field System that a century later aroused William Cobbett's ire as he rode from Huntingdon to Royston, and were familiar to Roger de Trumpington when he rode out, hawk on wrist, and for centuries before him. A field of grassy fallow, a second sown with spring corn, oats, peas, or beans, the third with winter corn, wheat or rye. Still the ploughman's rude song of half or quarter notes was heard as he sang to his teams of black long-horned Yorkshire or Derbyshire oxen, the favourite breeds. New varieties of wheat appeared in the valley as the eighteenth century wore on, Rivet (white and red) the Whole Straw, the Chilter and Ogave. There was a new strain of barley, too, the Rathripe, that ripened two or three weeks before older varieties. Cambridgeshire was almost wholly given up to growing wheat and barley, as Defoe had noted, and the surplus of the abundant harvests was sent by barge along the Cam all over the kingdom. Every year ended however in the vexed problem of winter feed for stock. It was solved by the introduction of the turnip as a crop, an innovation that banished the old three course rotation from the valley. Sheep could be fed in winter on turnips, soon followed by other root crops, swedes and mangolds, suitable for cattle, but sheep were particularly valuable. Turned into the stubble after harvest, they manured it, while the trampling of their small pointed hooves improved soil texture. The Norfolk Four Course Rotation proved of greatest value on the light soils, silts and loams, such as those of the valley. Much became heard of the

Golden Hoof, the flock of arable sheep fed in spring and summer on the seeds of the following rotation;

Roots — turnips or swedes.

Barley, or wheat, and oats on occasion.

Seeds, broad red clover with or without ryegrass, or alternatively, sainfoin or trefoil.

Wheat.

Lest the roots might be finished in spring before the seeds were ready to carry the flock, a small acreage was set aside for a catch crop of ryegrass, clover or oats. Once again a shepherd was mirrored in the stream, building pens with hurdles and split-willow cribs identical with those fashioned with a stone cleaving-axe three thousand years before, while the thin cry of new-born lambs answered the song of the lark. So successful did this cropping prove that with some modifications it enabled farmers of light soils to survive the economic crises of the 1920's and 1940's.

In 1794 Charles Vancouver published his *General View of the Agriculture of Cambridge*, a second edition of which appeared in 1811 and was re-issued in 1813. Enclosures had been known since Tudor days, but of the 98 parishes detailed by Vancouver, 83 were still open and only 15 were enclosed. Trumpington and Great Shelford were enclosed by Acts of Parliament in 1801 and 1834. It was early in the nineteenth century that the valley of Hobson's Brook took on the appearance of a chequer-board of green-leaved root crops, golden stretches of corn and lush meadows beside the stream, separated from each other by low hedges, that it is now losing. Enclosure was inevitable but it ruined the farm worker. At a stroke he lost all his valuable rights of grazing on common ground, of gleaning, of gathering wood, which enabled him to keep a cow, some hens, possibly a pig. "They say the law is tender to property" observed an old labourer sadly to Arthur Young "All I know is, I had a cow, and an act of Parliament took her away from me." Joseph Arch, champion hedger and champion of farm labourers, must not be forgotten, although the Agricultural Labourers Union he founded in 1872 did not survive him. After the Napoleonic wars, and in the Hungry 'Forties, bleak times led to pathetic riots. Ely saw some violent outbreaks, and the magistrates were sympathetic and disposed to be lenient. But my Lord of Ely displayed a vindictiveness that shocked public opinion at the time, and makes weary reading today. Labourers whose families were starving became frantic when their last hope of winter employment, threshing corn with flails, vanished when steam engines were introduced for the purpose. The juggernauts of pro-

gress that now came hooting and whistling up the valley of Hobson's Brook in the wake of top-hatted surveyors with their theodolites and gangs of Irish navvies. They laid the rails a few hundred yards west of the Nine Wells, carrying them over the first channel cut to convey the spring waters by means of a culvert. By 1845 the Great Eastern Railway was laid down in the shadow of White Hill, and subsequently the rural reach was bridged 700 yards south of Long Road (then Mill Road). "The principal rivers are the Cam and the Granta, and the Ouse; the latter river is navigable from Cambridge to Lynn in Norfolk, to which port quantities of the grain produce of this county hitherto have been sent by this navigation; but it will soon be a question whether the corn produce will not in future travel to London by the rail-road" thus wrote S. Jonas in 1847, two years after the opening of the London-Cambridge-Norwich main line, which entered Cambridgeshire at Great Chesterford and left it again after passing through Cambridge and Ely. Very true, but it posed a problem that grew ever more acute. So much farm produce was now carried away by the railroad, not only as vegetable produce, but as livestock, there was a real danger soils would be drained of vital minerals returned to them annually by the old Open Field System. Reflect in any Supermarket on the hundreds of tons of minerals in the vegetables and meat offered for sale, never returned to the soils where they were grown. At that early date, there was already a call for artificial fertilisers, search was made for Guano in countries far across the sea, and in Cambridgeshire a great Coprolite boom began in full swing around 1850. From Soham near Ely, through Granchester to Bedford, the phosphatic nodules so plentiful in the Greensand were dug up and crushed for fertiliser. Some were the mineralised remains of grotesque creatures flourishing at the time the spring strata were formed in the Chalk Sea. Professor J. S. Henslow had remarked in the mid 1840's that the nodules were sufficiently abundant to make it worthwhile to collect them. The average yield was 300 tons to the acre, and the nodules, or Coprolites, were worth about 50/- a ton. A great many men were employed in the industry, and the present size of Trumpington is largely due to the workings. They proved a rich source of phosphorus, whose loss from British soils was beginning to prove serious. As other sources became available, the boom died away, but in 1916 an attempt was made to re-open the workings, in order to save shipping space, but it was of short endurance.

Another minor industry that grew up in the 1850's was the cultivation of watercress. It had a delicate flavour that made cress from the Brook readily acceptable in London.



Part of the rural reach — containing a good growth of water cress.

The introduction of another root crop, Sugar Beet, helped those who struggled to continue farming in the valley during the years of depression after the first World War. In 1936 the common rotation was as follows

Sugar Beet

Barley

Barley

Seeds

Wheat.

Sheep, a heavy Suffolk breed, were folded in the stubble in 1948. Thereafter cropping routine was interrupted. Fields on both banks of the rural reach went down to grass in preparation for the Royal Agricultural Society's Show held in the valley south of Long Road in summer 1951. A board beside the leat gave much the same information as the present one at the Conduit Head, and a book entitled *Hobsons Conduit* could be obtained in the town, published by W. D. Bushell, one of the Brook trustees, in 1938. (Who in so doing put the Brook on public record a fourth time.) It was not perhaps realised however that an exhibit by the Ministry of Agriculture of a stand of wheat grown on the spot to show control of wheat crops, crowned a thousand years of cereal cultivation in the valley. It is recognised as some of the best wheat land near Cambridge, but only, it could be claimed, as a result of centuries of skilful treatment that have kept it in good heart. Ancestors of the lark that soared singing over the Grand Ring on the last evening of the Show, while prizes were being awarded for the jumping competitions, had sung to an unbroken procession of ploughmen and reapers since the dawn of British history. Phosphatic fertiliser was spread beside the middle reach of the rural reach early in spring 1952, after the Royal Show, while cattle were turned in to graze on the grass immediately south of Long Road. Some simultaneous estimations of phosphorus, potash and nitrogen in the soil of the middle third and in the Brook water showed some correlation; especially as regards nitrogen, the curves tended to follow one another. In the summer of that year, 1952, there was a massive growth of *Sparganium* and other plants in the upper third of the reach, choking the stream although hitherto the water had been fairly clear at this time of year. A similar eutrophication was observed in the late summer of 1948 in the middle third of the rural reach, after the banks had been heavily dressed with farmyard manure during a spell of hot, thundery weather. Two weeks later there was a massive growth of watercress, *Nasturtium officinale*, that spread far downstream, and caused the water to rise behind it to a depth of several

feet far back into the channels leading the spring water into the leat. Sheep have not returned to the valley. At the time of writing, and for the past dozen years or so, an intensive practice has been followed with relatively heavy top-dressings of mineral fertilisers and wheat may be grown for three or four years in succession without a break. As an example of present fertiliser practice, in mid-April 1970 the land beside the east bank of the middle third of the rural reach was dressed with 300cwt (approx $6\frac{1}{2}$ cwt per acre) of a mixture yielding 20 parts Nitrogen, 15 Potassium and 15 Phosphorus. At the end of the month the land on the west bank was dressed with the same amount ($6\frac{1}{2}$ cwt per acre) of the same mixture. On the second of May the land beside the east bank also received liquid Nitrogen yielding 72 units of Nitrogen. Comparable amounts of fertiliser have been spread beside the Brook in recent years, thoroughly dispersed by extensive irrigation once or twice a year. The most modern machinery has been introduced to irrigate the soil, and to obtain sufficient water, the stream is dammed close to a foot bridge at the centre of the rural reach by a metal sheet dropped into concrete slots. The land is better drained than formerly by large earthenware pipes opening into the Brook, and since irrigation may be carried out for eighteen hours a day, quantities of fertiliser solution presumably escape into the water. Much of the old grassland round the Shelford stream has been ploughed up and brought into cultivation, and some small fields and hedges have gone in order to obtain larger units for tillage. Three fields for example that once bordered the centre of the rural reach are now represented by one unit of 45 acres. One result is that it is easier now to imagine the valley during the Open Field System, the picture that gladdened the sun-dazzled eyes of Sir Roger when he returned from the Holy Land.

'His silver helmet did outshine

The burning sun of Palestine'

Sweating under the weight of mail shirt and iron casque, how often he must have licked his parched lips at the memory of the crystal waters of the Wells!

Chapter 5

THE LIFE OF THE BROOK

A study of the natural history of the Brook from 1946 - 49 was concentrated on the rural reach (although the urban reach was not neglected) because it is surrounded by arable land and was intermittently polluted by sheep who lambed in spring on the banks and were folded in the stubble after harvest. The initial aim was to check certain conclusions made by A. H. Hassall M.D. on the Thames in 1852, namely that particular ciliate protozoa (animalculae) may be adopted as indicators of pollution in water because they found in the pollution 'means of subsistence and growth'. The animalculae, as none knew better than he, are but part of the natural history of inland waters. Those in the Brook were considered in relation to the plants and animals in the stream identified by University authorities. Flowering plants, Watercress, Water Starwort, and so forth, the flowerless algae, and the Caddis flies, Water limpets and other animals the plants provided with shelter and food. *Chironomids* (midges) and *Simuliidae* (black-fly) were very abundant every year in late summer, when the water teemed with their aquatic larvae and imagoes rose from the surface in clouds particularly in the middle third of the rural reach. The angles at which the channels joined each other made it convenient to divide the reach into four arbitrary Zones. Zone 1 ran from the springs to a railway culvert 100 yards downstream, and a typical spring was chosen to represent this Zone. In Zone 2, which succeeded it and was 486 yards long, the water ran fast down the 45 foot contour over a chalk floor followed by a long gravel stretch. Zone 3, 868 yards in length, stretched from the end of Zone 2 to a culvert carrying the former Bedford railway across the Brook, and its floor was composed of earth and chalk with two gravel patches. The parent, Shelford stream, entered at the junction of the Zones. Finally, Zone 4, 694 yards long, ran from the Bedford railway to Long Road, its floor was silt deposited on chalk and chalk mud. Zones 1 and 2 had a more uniform temperature, about 10° C, than the lower third of Zone 3 and Zone 4, which were colder in winter and warmer in summer, varying from 5° - 15° C. The waters of the chosen spring, often issuing with force sufficient to raise a spurt of foam, tended to be neutral, as were those of Zone 2, but thereafter they became increasingly alkaline. Some random tests indicated that the winter waters were almost saturated by oxygen, but that as the year advanced the content steadily diminished except in the gravel reach



*Kingfisher – kingfishers were once common along the stream, but they are now restricted to the reaches near Brooklands Avenue.
R.S.P.B. / Michael W. Richards.*

of Zone 2. The linear rate of flow in this reach averaged two feet per second, but at the measuring post in Zone 4 it was only two inches per second. Now at three feet a second heavy shingle can be moved about, so that it was not surprising to find gravel shifted occasionally in Zone 2. But at five inches per second nothing heavier than clay particles can be moved. There is always a quantity of suspended mineral matter in the stream, and plant nutrients absorbed to clay or mineral particles would precipitate out in midstream as the current slackened through the lower third of Zone 3 into Zone 4. It was assumed therefore that during winter 'capital' was laid down on the floor of the lower Zones, in readiness for plant growth in spring.

The flowering plants were characteristic of chalk water, and rather restricted both in numbers of species and of individuals. Certain species favoured particular regions, and there was a marked seasonal distribution. The sword-like leaves of *Sparganium* were the first to shoot in spring in pockets close to the springs, and in clumps in Zone 3 and the urban reach. The feathery heads of the Common Reed *Phragmites* next became conspicuous bordering the gravel reach of Zone 2, and just south of the Bedford railway bridge. The Water Cress *Nasturtium officinale* flowered and seeded in late summer with certain other plants. Even in winter however, when the hare limped across the frozen fields, many plants could be found in the vegetative stage, and in the urban reach Pondweeds (*Potamogeton*) flourished all the year round. Representatives of the Phyla and Sub-phyla into which the Animal Kingdom is divided could be found. The Freshwater Limpet *Ancylus fluviatilis* recorded in the Brook by H. Brindley of St. Johns College seventy years ago was quite plentiful in the Zone 2 gravel reach, but not found elsewhere. By contrast, the Wandering Water Snail *Limnaea pereger* was found throughout the length of the rural and urban reaches. Caddis Flies (*Trichoptera*) fluttered in midsummer on the banks of Zone 3 and in the urban reach a hundred yards south of the teak bridge, but Blue Demoiselle Dragonflies (*Calopteryx* sp.) were most noticeable in late summer on the banks of the chalk cutting of Zone 1. The Kingfisher flashed along the upper stretches of the rural reach, and there was a thriving colony of the Water Vole (*Arvicola*) in the banks of the stream immediately north of Long Road, and a second colony far upstream about the junction of Zones 1 and 2.

So far as the immediate object of the survey was concerned, the Brook had its own indigenous population of bacteria (microbes) adapted to the cold, alkaline waters, supplanted during continuous rain or, more espec-

ially, when drought crumbled the banks into the stream, by soil bacteria that reflected agricultural activities. Every autumn one species very common in arable land after ploughing, appeared in the Brook when the stubble was ploughed up; and every spring and summer the water was filled by what are technically called Gram-negative rods, which were believed to come from the roots of the ripening wheat. They were very important, because they proved to be the chosen food of the animalculae Hassall had in mind. In grazing upon them — and their grazing propensities, as he had pointed out, were fostered by a low temperature and an alkaline reaction of the water, the conditions prevailing in the Brook — the animalculae would incidentally destroy the bacteria of pollution, also Gram-negative rods, and thus purify the stream. One Brook animalcule (*Stylonichia mytilus*) that preferred Zone 3 to all others, exhibited a remarkable lunar cycle, it was most abundant at the full moon or new moon. Animalculae live in soil, and all those in the Brook were represented in the soil of the banks, so a free exchange was assumed, one habitat being the source of the other.

An unexpected microbiological bonus was the discovery of an aquatic Nitrogen-fixing bacterium, which 'fixed' quite appreciable quantities of atmospheric Nitrogen, i.e. converted it into nitrates plants could use for growth. Found in the vicinity of green plants in spring and autumn, but especially in autumn, it was also isolated from the Cam near Byron's Pool, and the Bourn Brook. The late Professor A. J. Kluyver, the authority on the group, confirmed that it was a new species, and a photograph taken in Holland with the electron microscope was exhibited in the Hall of Science at the Festival of Britain in 1951.

Reports on all these diverse excursions of course put Hobson's Brook on public record for the fifth, sixth, and seventh times, far beyond its peaceful valley, too.

Hassall's conclusions were vindicated, delegates attending an International Congress held at Cambridge in 1953 were told. But the importance of agriculture in the life of such streams was the great lesson that had been learnt from the Brook whose waters sparkled in the runnels beneath the lecture hall windows.

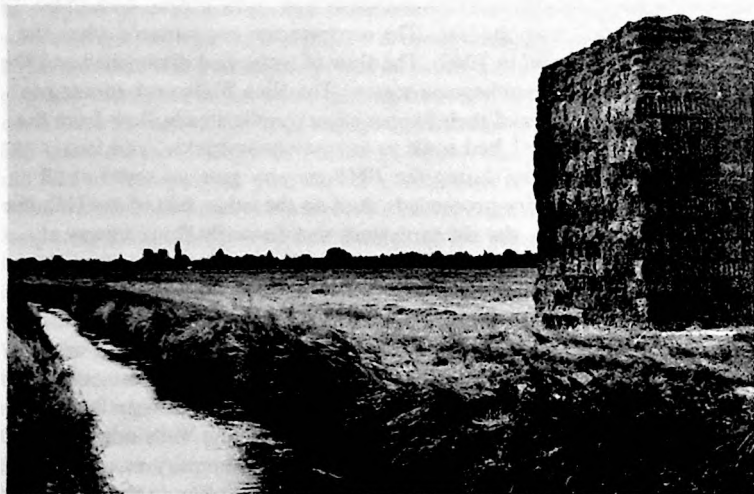
Chapter 6

THE FUTURE BROOK

Hobson's Brook flows in a course dictated by the activities of two mediaeval Kings, and the bodies of two recent Kings, George V and George VI, have been carried over it, from Sandringham through Cambridge across the railway culvert, opposite the Nine Wells, to lie in state at Westminster. George VI was accompanied on his last journey by three Queens, his mother the Dowager Queen Mary, his wife the Queen Mother, and his daughter Elizabeth the Second. Even as Alfred Lord Tennyson, graduate of Trinity College, Cambridge, wrote of three Queens who waited on the passing of Arthur. And the Brook was projected in the days of the first Elizabeth. As the train passed slowly down the valley, those working in the fields pulled off their hats in homage, the heirs and descendants of Hervey and Picot and Ralph the Reeve of the Hundred. The late T. C. Lethbridge once told the author that in the local Home Guard platoon during the war, two farm workers bore the names of two peasants indicted for High Treason after the Peasants Revolt of 1352, and he had no reason to suppose they were not direct descendants. The story of the Brook is a romantic one, and the natural picture it revealed during the 1946 enquiry appeared to be fixed indefinitely, within rather narrow limits, by the physical characters of the water gushing from the Nine Wells. They had never been known to dry up in living memory, and the farmer at White Hill knew the same stream that his father knew, and his grandfather, and old folk at Trumpington who in their youth collected the famous Brook watercress for the London market. There was some scientific evidence for supposing the picture had always been much the same. In 1944 Canadian workers reported that continuous planting of one crop, e.g. wheat or oats, may be expected eventually to stabilise the bacterial, microbial, balance of the soil, and result in a bacterial microflora characteristic of that crop. With the Gram-negative rods in mind found in the stream, and attributed to the roots of cereals, the author wrote to enquire how long such a process might take, and a thousand years was postulated. Reference to County Histories and other sources, some verbal, showed an unbroken history of cereal cropping in the valley back to Domesday Book and far beyond. Wheat had been grown in the valley for a thousand years, if the farms on the chalk were included, for double that period of time. If the Canadian workers were correct, then it was reasonable to suppose that a

microflora characteristic of cereal cropping was established in the soil, possessing a hard core of those Gram-negative rods which are abundant round the roots of wheat, and multiplying enormously as the corn ripened, escaped into the Brook to nourish animalculae which destroyed pollution and purified the waters. Obstruction to the current by such accidents as the eutrophication of watercress in Zone 3 was corrected by the pulse of the springs, finally overcoming the obstacle and sweeping away stagnant water in which putrefactive bacteria flourished. At the same time, it was not forgotten that the bacterial balance of the soil was preserved by the skilful treatment the land received. The soil was capital to be carefully invested, not squandered, nor was it a wholly impersonal business. A countryman feels an inarticulate sympathy for soil and animals under his charge. But the Brook benefited as a result. It was in good heart because the arable land through which it flowed was in good heart. In the last analysis, however, the character of the soil practice adopted was imposed by the natural forces responsible for the conformation of the valley, the loam deposited in the old river gravels and the strata of the spring line. So far as the life of the Brook was concerned, all depended upon the spring flow. The promise the prophet made 'Everything shall live whithersoever the river cometh' was fulfilled while fresh spring water gushed by day and night far down the leat. The converse was encountered when the second enquiry opened in 1969. The flow of water had diminished and the life in the stream had become scarce. The Nine Wells were running to no more than a quarter of their former capacity, the steady flow from the spring chosen in Zone 1 had sunk to an apologetic trickle, and two adjacent springs running during the 1946 enquiry gave no water at all while the second enquiry proceeded. And on the other side of the Hill, the waters of the spring by the old earthwork that formerly flowed away at ground level, had now to be sought by digging a pit that held water in winter but not in summer. In the reach below the Wells, the water level was low in 1971, and the succeeding year 1972 was the driest in the district since 1951. The writer was informed that it was believed the water table had altered and the Nine Wells were drawing on a different catchment area. During the 1946 enquiry, Professor King, University Professor of Geology, was of the opinion that during drought the Wells might possibly draw upon the Cam. The purpose of the 1969 enquiry was to study the survival in nature of the coliform bacteria of pollution in the original Zones 1, 2, 3 but not 4. Confined to the mouth of the Shelford stream during the first enquiry, they were now to be found in all Zones at all sea-

sons, despite the absence of sheep on the banks. Insects conspicuous during the first enquiry, May flies, Caddis flies and so forth, were not noted, and only a feeble peak of Midges, but not Blackfly, persisted in late summer in the centre of the rural reach. The Miller's Thumb had gone with the Kingfisher. Irrigation might be responsible for reduction of animal life, for nests and burrows were flooded when the water level rose behind the dam. Presenting a paradox, that when the spring flow grew less, animals were drowned. Clumps of *Sparganium* had disappeared from the centre of the stream with the reed beds that formerly fringed Zone 2. However, blooms of algae and flowering plants occurred during the spring and summer of the three years 1970 - 71 - 72. In 1970 these did not coincide with mineral dressing of the land adjacent to Zone 3. During spring and summer that year, eight analyses for phosphorus were carried out on the water of Zone 3. Figures were considered to be low, although they confirmed that phosphorus did appear in the stream after the banks received it. At microscopic level, animalculae were not abundant, and bacteria were negative in character compared with the earlier microflora. The silence at the Nine Wells from 1970 was most noticeable after the constant murmur of water background to the first enquiry, and emphasised



*Modern agriculture has changed the valley – baled straw after harvest.
(Summer 1971)*

the suggestion put forward to delegates to the International Congress of 1953, that the life of the Brook hinged upon agricultural practice which was itself dominated by soil and climate. The climate of the district had altered, and the life of the Brook suffered because the stream was perforce dammed for irrigation when the gush of spring water diminished. If the climate of the 1946 enquiry ever be restored, so that the Wells once more run to full capacity and adequate ground water makes irrigation superfluous, then it is reasonable to assume that the life of the Brook will regain all its pristine vigour. The springs will always run, given sufficient water, because of the strata laid down aeons ago by lost rivers running from a forgotten continent into the Chalk Sea. At present there is no sign of this. Continued drought gripped the valley so severely, that in the summer of 1976 the Nine Wells almost ceased to run. However, a rescue operation has been mounted to save some of the best wheat land near Cambridge. Water will be piped in from outside sources to supplement the feeble spring flow, and provide a constant and abundant supply for irrigation. *Everything shall live whithersoever the river cometh*, but it will be most instructive to see what plants and animals establish themselves in the future stream when the waters are no longer a cold, pure alkaline flow from chalk springs, but of very mixed origin, dubious by contrast with their former purity. A page has turned in the story of Hobson's Conduit, yet it should not be concluded that it is the end of a chapter. There will still be a Brook, that when the harvest moon hangs over White Hill will again reflect the ghosts that gather in the golden fields of stubble to celebrate one more Harvest Home; Knight and Reeve and prehistoric farmer, and the ploughman whose activities are subtly reflected in the life of the stream.

Hobson's Conduit is the fourth in a series of Cambridgeshire books, published by Bird's Farm Publications of Barton, Cambridgeshire. The enterprise was started in 1975 to produce books of local interest, written and produced by local people.

Any comments or ideas for future works will be welcome.

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HOBSON 5 CONDUIT

IN 1964 A KAMP ENTRUSTED TO THE UNIVERSITY AND THE TOWN OF LANCASTER MANAGED A NUMBER OF SHOWING, WATER INTO THE TOWN FROM BRUNNEN AT TOWN BRUNNEN. THEREBY, BECAUSE THE LARGER ONE WAS WITH A BRUNNEN IN THE TOWN AND THE LARGER ONE WAS IN THE TOWN AND THE LARGER ONE

FROM THE 1000 THE FOLLOWING
STORY: JOHN MARSHALL HILL, WHOSE
SERVED AS A PRISONER IN THE LATE
1940s, DESCRIBED THE FOLLOWING OF
A SMALL GROUP OF MEN OF THE
CAMBODIAN ARMY, DURING THE
PRISONING BY WHICH IN THE 1970s

1. The following are the names of the persons who have been identified as having been in contact with the subject of this investigation:

£1.10